Homework 6

~~0 mod 9~~
~~0 mod 1~~
~~0 mod 2~~

Q 1

h(k)	index	keys
0 mod 9	0	
1 mod 9	1	19 → 10
2 mod 9	2	2 → 20
3 mod 9	3	39
4 mod 9	4	22
5 mod 9	5	5
6 mod 9	6	
7 mod 9	7	
8 mod 9	8	8 → 35 → 26

Q 2.

The probability that there will be a collision between k an l is $\frac{1}{m}$ where m is the length of array T

∴ If I_{kl} is the indicator random variable where k and l collide.

$$\text{Probability of } I_{kl} = \frac{1}{m}$$

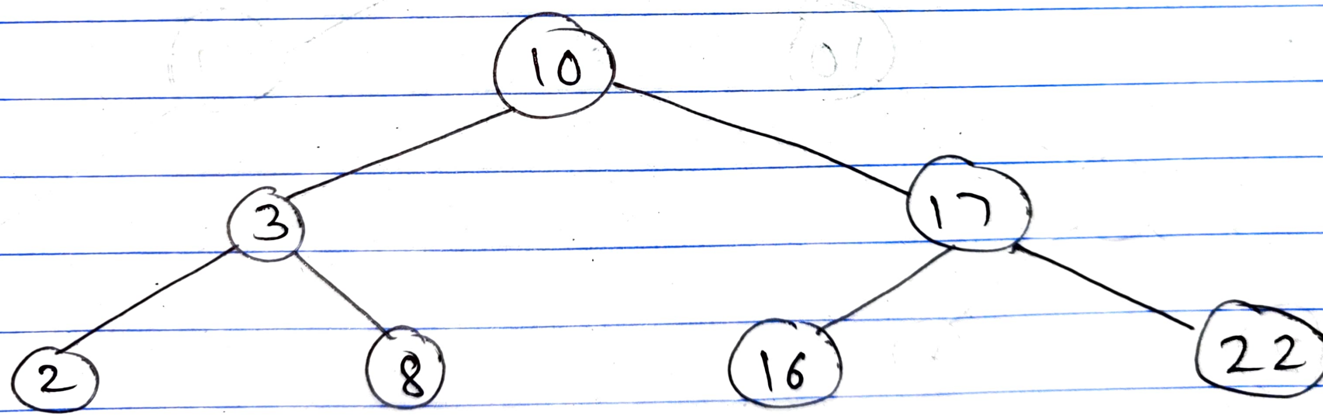
If k and l are two distinct keys, we can select them in $\frac{n(n-1)}{2}$ ways.

∴ Expected number of collisions between k and l can be given by

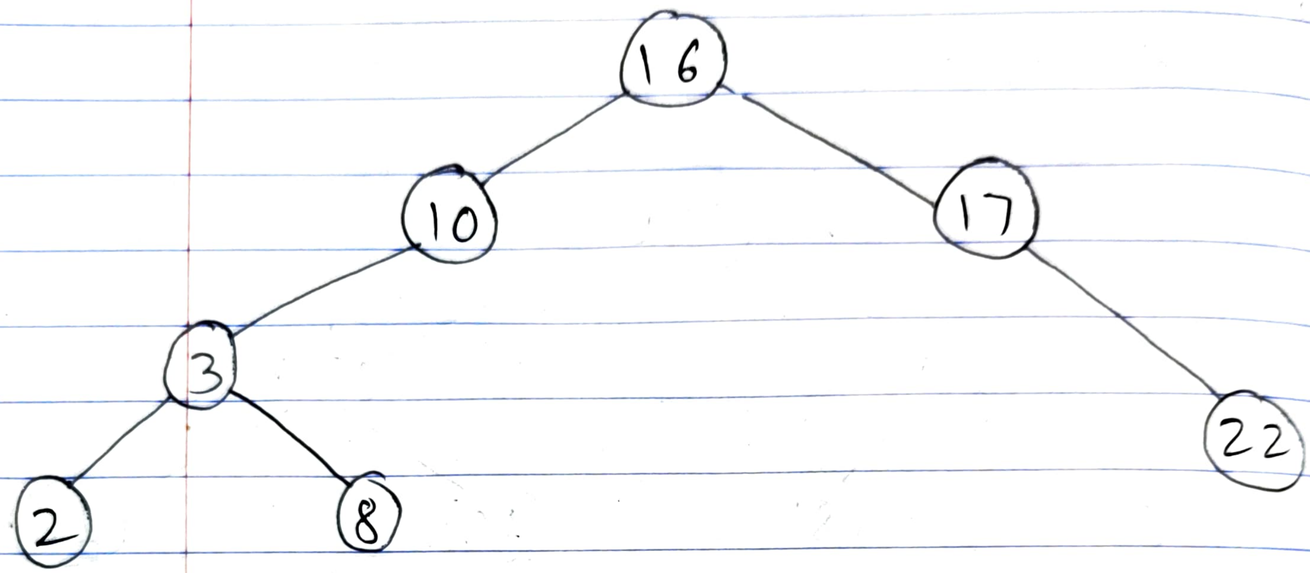
$$\boxed{\frac{1}{m} \times \frac{n(n-1)}{2}}$$

Q3.

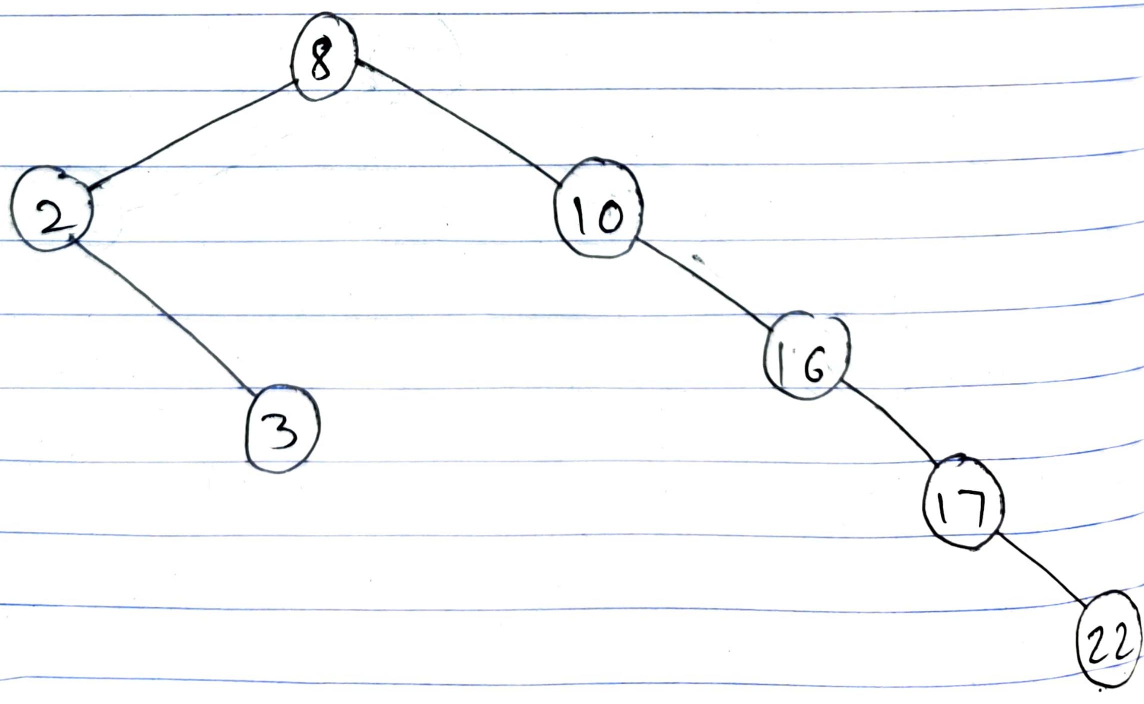
Height = 2 :



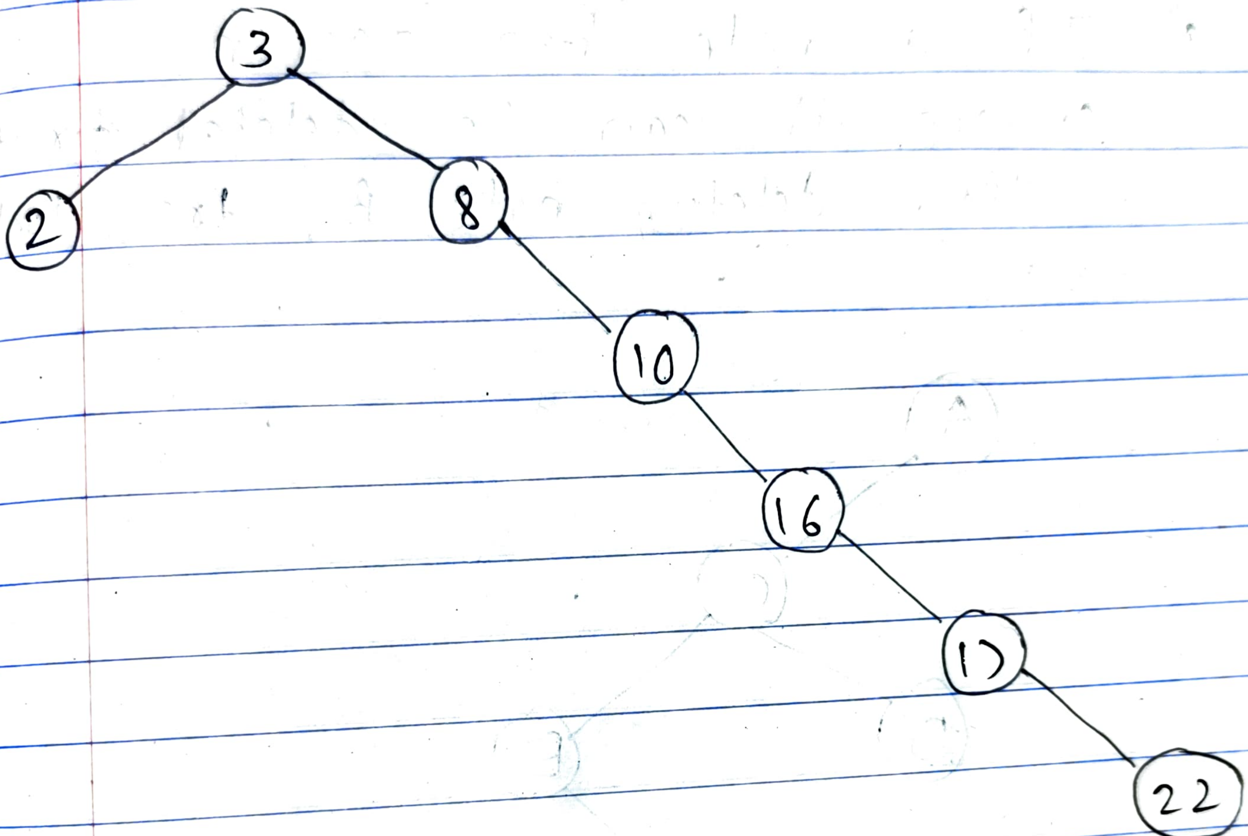
Height = 3 :



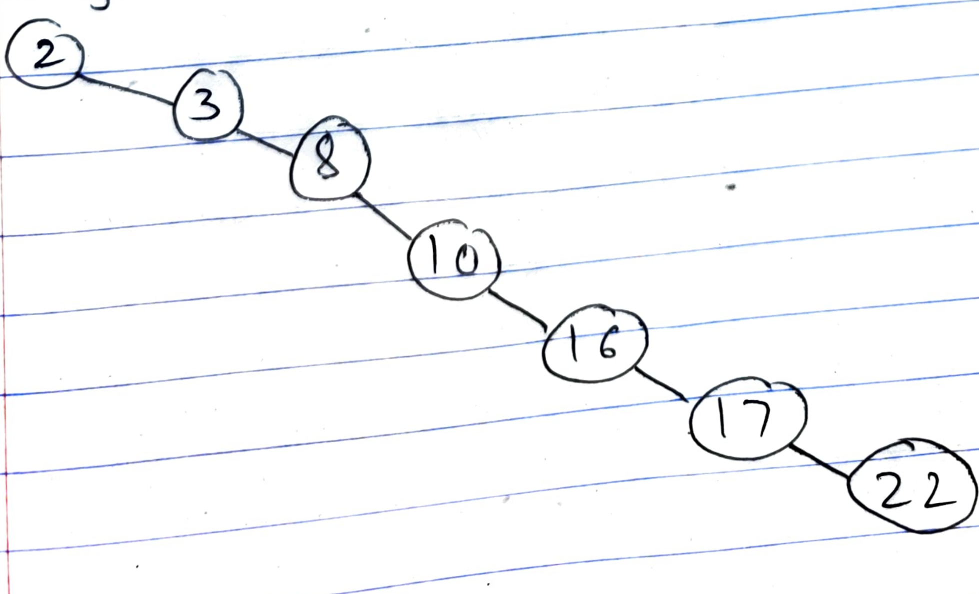
Height = 4 :



Height = 5

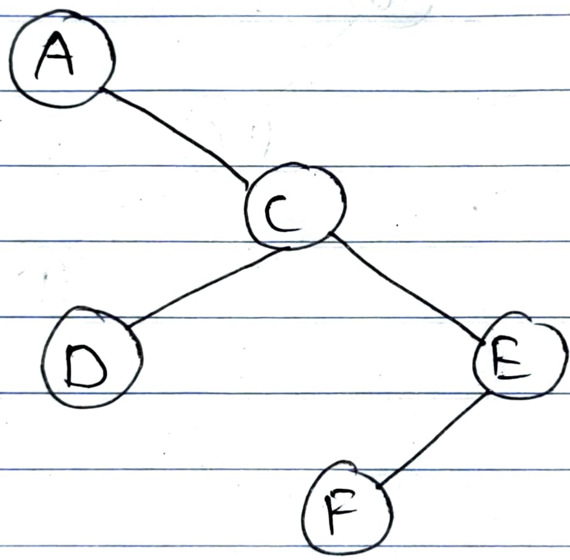


Height = 6



Q4)

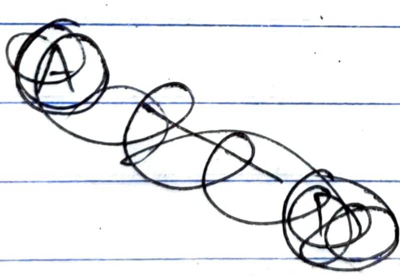
a) If a node ~~han~~ has no children, it can be deleted directly.
∴ After deleting node B, tree looks like →

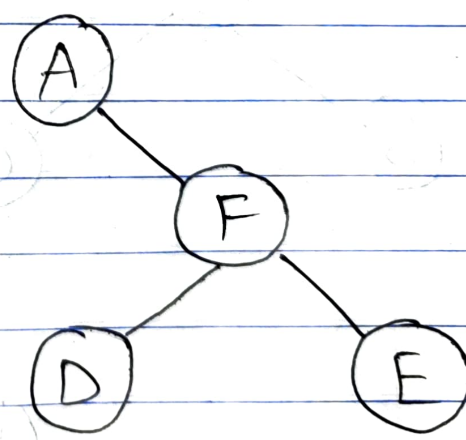


b) When deleting a node with two children, we ~~replace~~ ~~th~~ remove the node to be deleted and put the node with the smallest value in the right subtree of the node to be deleted.

To delete C, we replace it with F, which is the smallest in C's right subtree.

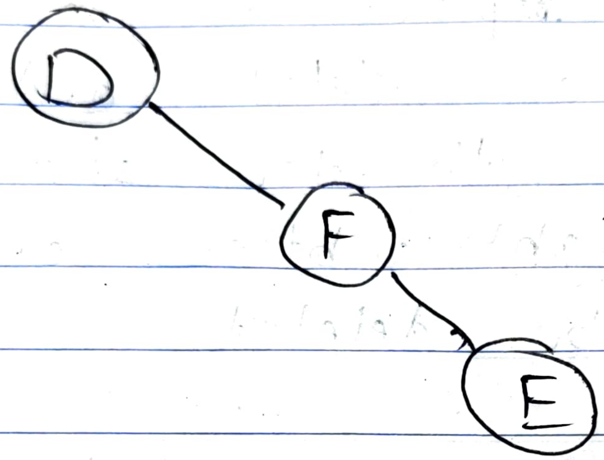
∴ Tree looks like →





Note:
F > D because all elements to right of C are greater than all elements to left

c) Similarly to delete A, we put D in A's position



d) Deleting A from original tree, A is replaced by D ∴ Tree becomes →